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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/618,970	07/14/2003	Eko N. Onggosanusi	TI-34889	5929
23494 7590 02/01/2007 TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			EXAMINER EJAZ, NAHEED	
			ART UNIT	PAPER NUMBER
			2611	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/01/2007	PAPER	

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

**Office Action Summary**

Application No.

10/618,970

Applicant(s)

ONGGOSANUSI ET AL.

Examiner

Naheed Ejaz

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 10 and 11 is/are rejected.
- 7) ☒ Claim(s) 2-9 & 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments with respect to claims 1, 10 & 11 have been considered but are moot in view of the new ground(s) of rejection.

### ***Response to Amendment***

#### ***Claim Objections***

2. Claim 19 (page # 5, line 9) is objected to because of the following informalities: replace "Claim 19 (original)" to ---Claim 10 (original)---. Appropriate correction is required.

#### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beery et al. (5,805,613) in view of Benesty et al. (2004/0013212) (hereinafter, Beery & Benesty respectively).
5. Regarding claim 1, Beery discloses a method for decoding (claimed 'method of detection') that includes dividing the received symbols into a number of blocks per codeword and decoding them separately and simultaneously (see Abstract, figures 1 & 3, col.6, lines 24-61) which reads on claim limitations of having 'receiving a signal representing a set of P symbols where P is a positive integer greater than 2 (figure 1,

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elements  $X_1$ - $X_6$ ) (b) jointly estimating a subset of  $P_1$  symbols of said set of  $P$  symbols where  $P_1$  is a positive integer (figure 1, elements  $X_1$ - $X_3$ ) (c) after step (b), jointly estimating a subset of  $P_2$  symbols of said set of  $P$  symbols where  $P_2$  is a positive integer (figure 1, elements  $X_4$ - $X_6$ ) and wherein said subset of  $P_1$  symbols and said subset of  $P_1$  symbols are members of a partition of said set of  $P$  symbols and  $P_1+P_2$  is greater than 2' (col.4, lines 38-63) (it is noted in the mentioned column and lines that Beery is teaching hexacode decoders which always include more than 2 symbols therefore reads on claim limitations of having 'set of  $P$  symbols and  $P_1+P_2$  is greater than 2').

Beery does not disclose one symbol transmitted from each of  $P$  antennas.

Benesty teaches multiple input multiple output (MIMO) communications systems (figure 1, page # 2, paragraph # 0016). Benesty is transmitting a single data stream across a wireless channel with use of a communications link comprising  $M$  transmitting antennas and  $N$  receiving antennas (figure 1, page # 2, paragraph # 0016) which reads on claim limitations of 'one symbol transmitted from each of  $P$  antennas'.

It would have been obvious to one of ordinary skill in the art, at the time of invention was made, to incorporate the multiple antenna communications systems (MIMO systems) of Benesty into Beery in order to achieve high spectral efficiencies with no increase in bandwidth or transmitted power as taught by Benesty (page # 1, paragraph # 0002).

6. Claims 1 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyata et al. (6,912,684) in view of Benesty et al. (2004/0013212) (hereinafter, Miyata & Benesty respectively).

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7. As per claim 1, Miyata teaches, 'receiving a signal representing a set of  $P$  symbols where  $P$  is a positive integer greater than 2' (figure 9, element 'Reception sequence', col.19, lines 11-14), 'jointly estimating a subset of  $P_1$  symbols of said set of  $P$  symbols where  $P_1$  is a positive integer' (figure 9, elements 171 & 177, col.19, lines 17-19 & 30-37), 'jointly estimating a subset of  $P_2$  symbols of said set of  $P$  symbols where  $P_2$  is a positive integer' (figure 9, elements 172 & 178, col.19, lines 17-22 & 38-44), 'subset of  $P_1$  symbols and said subset of  $P_2$  symbols are members of a partition of said set of  $P$  symbols and  $P_1 + P_2$  is greater than 2' (figure 9, elements X,  $Y_a - Z'_{b,p}$ , col.20, lines 5-13).

Miyata does not disclose one symbol transmitted from each of  $P$  antennas.

Benesty teaches multiple input multiple output (MIMO) communications systems (figure 1, page # 2, paragraph # 0016). Benesty is transmitting a single data stream across a wireless channel with use of a communications link comprising  $M$  transmitting antennas and  $N$  receiving antennas (figure 1, page # 2, paragraph # 0016) which reads on claim limitations of 'one symbol transmitted from each of  $P$  antennas'.

It would have been obvious to one of ordinary skill in the art, at the time of invention was made, to incorporate the multiple antenna communications systems (MIMO systems) of Benesty into Miyata in order to achieve high spectral efficiencies with no increase in bandwidth or transmitted power as taught by Benesty (page # 1, paragraph # 0002).

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8. Regarding claim 11, Miyata discloses a technique of a calculation means of the soft-input and soft output decoders (col.2, lines 19-27) which reads on claim limitations of having estimation steps that include soft decision.

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beery et al. (5,805,613) in view of Benesty et al. (2004/0013212), as applied to claim 1 above, and further in view of Berrou (5,446,747).

10. Regarding claim 10, although Beery teaches maximum likelihood decoding (col.2, lines 4-7) for Hexacode block codes but Beery and Benesty do not explicitly disclose maximum likelihood decoding.

In the same field of endeavor, Berrou uses maximum likelihood algorithms for decoding which reads on claim limitations of having estimation steps that include maximum likelihood decision.

It would have been obvious to one ordinary skill in the art to implement the teachings of Berrou into Beery and Benesty in order to take account of a large number of received symbols hence increase the reliability of the decision as taught by Berrou (col.2, lines 10-14).

***Allowable Subject Matter***

11. Claims 2-9 & 12 are objected to as being dependent upon a rejected base claim 1, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Lim (5,654,986) teaches method and apparatus for decoding trellis coded QAM signals.
- Penther (2002/0167998) discloses channel delay spread adaptive equalization and decoding.
- Hulyalkar et al. (6,850,563) teach data slicer for combined trellis decoding and equalization.

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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**Contact Information**


14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Naheed Ejaz whose telephone number is 571-272-5947. The examiner can normally be reached on Monday - Friday 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Naheed Ejaz  
Examiner  
Art Unit 2611

N.E.  
1/23/2007

  
PANKAJ KUMAR  
PRIMARY PATENT EXAMINER